Algebra 2 Name:

Polynomials and Multiplicity of Roots Date: Period:

A graphing calculator or graphing app on a mobile device is required.

Multiplicity of Roots

1. Graph $y = -\frac{1}{2}x(x-3)(x+2)$.

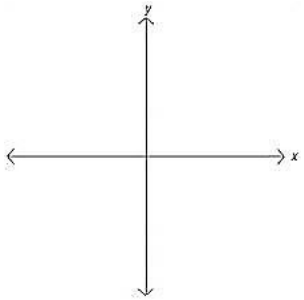
Degree:

Leading Coefficient:

End Behavior:

Roots:

Sketch the graph.



2. Graph $y = -\frac{1}{2}x^2(x-3)(x+2)$.

Degree:

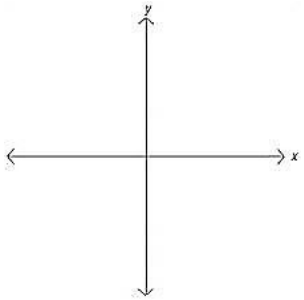
Leading Coefficient:

End Behavior:

Roots:

What did the exponent do to the graph?

Sketch the graph.



3. Graph $y = -\frac{1}{2}x(x-3)^2(x+2)$.

Degree:

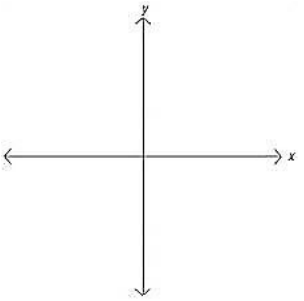
Leading Coefficient:

End Behavior:

Roots:

What did the exponent do to the graph?

Sketch the graph.



4. Graph $y = -\frac{1}{2}x(x-3)(x+2)^2$.

Degree:

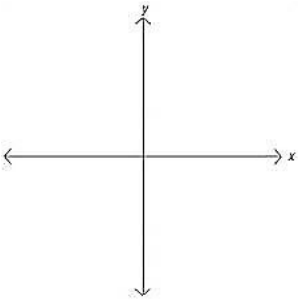
Leading Coefficient:

End Behavior:

Roots:

What did the exponent do to the graph?

Sketch the graph.



Multiplicity refers to the exponent to which a factor is being raised. $(x-3)^7$ The root of 3 with multiplicity 3, or 3 (mult 3).

5. Graph $y = (x+5)(x-7)$.

Degree:

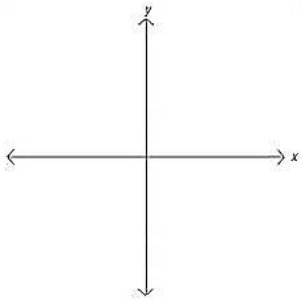
Leading Coefficient:

End Behavior:

Roots (with multiplicity):

What did the exponent do to the graph?

Sketch the graph.



6. Graph $y = (x+5)(x-7)^3$.

Degree:

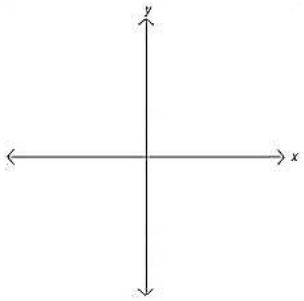
Leading Coefficient:

End Behavior:

Roots (with multiplicity):

What did the exponent do to the graph?

Sketch the graph.



7. Graph $y = (x+5)^2(x-7)^3$.

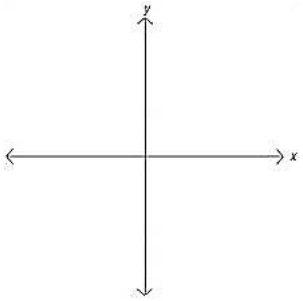
Degree:

Leading Coefficient:

End Behavior:

Roots (with multiplicity):

Sketch the graph.



8. Graph $y = (x+5)^2(x-7)^2$.

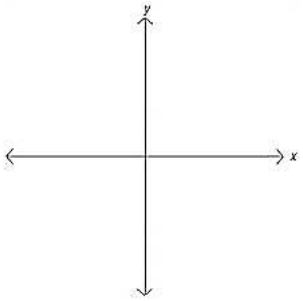
Degree:

Leading Coefficient:

End Behavior:

Roots (with multiplicity):

Sketch the graph.



The multiplicity of the roots of a polynomial affects the degree, the leading coefficient, the end behavior, and HOW the graph passes through each root.

→ When a root has multiplicity of 1, like (x + 3), the curve will pass through the root like a line.

→ When a root has multiplicity of 2, like $(x - 4)^2$, the curve will pass through the root like a parabola.

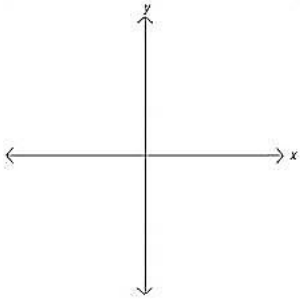
→ When a root has multiplicity of 3, like $(x - 1)^3$, the curve will pass through the root like a cubic.

Example: Graph $y = -2x(2x-7)^2(x+4)^3$.

Step 1: End behavior

Step 2: Roots (with mult)

Step 3: Plot what you know.

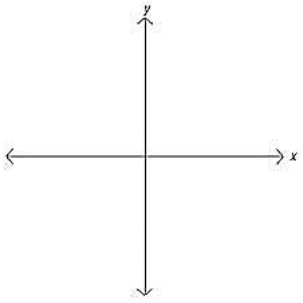


Step 4: Sketch the graph.

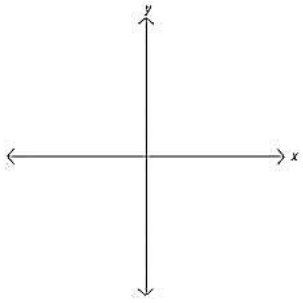
Graphing Polynomials HW #2

For each polynomial function, find the end behavior, leading coefficient, roots (with multiplicity), and sketch the graph.

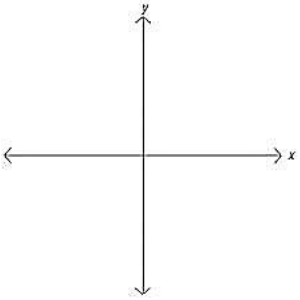
1. $y = (x+6)^2(x+7)$



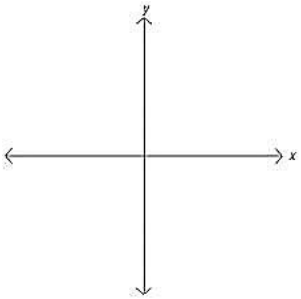
2. $y = (x+5)(x-2)(x+1)^2$



3. $y = x(x-2)^2(x+3)^2$

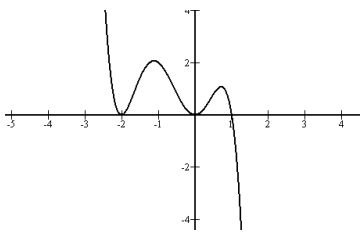


4. $y = (x-1)(x+4)^3$

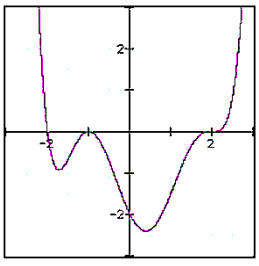


Write a possible equation to represent the given graph.

5.



6.



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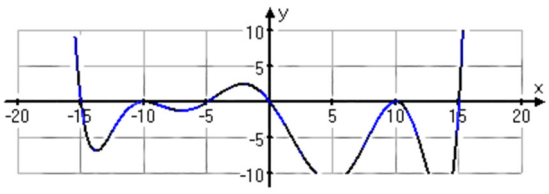
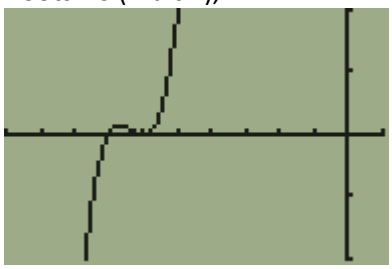
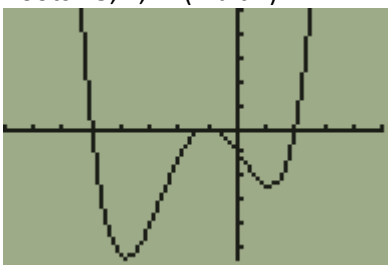


Answers

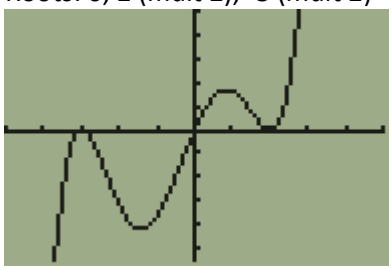
1. End behavior: ↓↑
Roots: -6 (mult 2), -7



2. End behavior: ↑↑
Roots: -5, 2, -1 (mult 2)



3. End behavior: ↓↑
Roots: 0, 2 (mult 2), -3 (mult 2)



4. End behavior: ↑↑
Roots: 1, -4 (mult 3)

5. $y = -Ax^2(x+2)^2(x-1)$

6. $y = A(x+2)(x+1)^2(x-2)^3$

7. $y = Ax(x+15)(x+10)^2(x-10)^2(x-15)$